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High Density Digital Form for Cultural Heritage: Synthetic Modelling and Reverse Engineering of the Four Horses of the Basilica of San Marco In Venice

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Transportable 3D Acquisition Systems for Cultural Heritage. Reverse Engineering And Rapid Prototyping of the Bronze Lions of the Saint Isidoro Chapel in the Basilica of San Marco In Venice

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Laser Scanning Methodology for the Structural Modelling

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3D Modelling of Heritage Objects by Fringe Projection and Laser Scanning Systems

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Session 13: Spatial Information Management

GIS And Web-GIS, Commercial and Open Source Platforms: General Rules for Cultural Heritage Documentation

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GIS-Based Impact Assessment Model In Urban Historic Culture Heritage Protection and Planning

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Digital 3D Reconstruction of Antonio Gaudi's Lost Design for a Church Near Barcelona Spain

M. Moser, K. Hanke

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Photogrammetric Documentation and Visualization of Choli Minaret and Great Citadel in Erbil/Iraq

K. Pavelka, J. Svatuskova, V. Kralova

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Combination of Terrestrial Recording Techniques For 3D Object Modelling Regarding Topographic Constraints. Example of the Castle of Haut-Andlau, Alsace, France

T. Landes, P. Grussenmeyer, T. Voegtli, K. Ringle

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P. Patias, Ch. Saatsoglou-Paliadeli, O. Georgoula, M. Pateraki, A. Stamnas, N. Kyriakou

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Topographic and Photogrammetric Recording of the Acropolis of Athens

D. Moullou, D. Mavromati

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Session 15: Non-conventional Photogrammetric applications

A Digital Map for the Interior Restoration of St. Ninian's Cathedral

S. Nickerson

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Saint Anthony's Chapel Facade Pathology Documentation

M.R. Gardiol, A.M. Pighini

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Documentation of a Vernacular House with Close-Range Digital Photogrammetry

I. Akbaylar, M. Hamamcioglu-Tutan

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Quickbird Imagery Processing For The Extraction Of Archaeological Features: Performance From Data Fusion Algorithms

N. Masini, R. Lasaponara

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Virtual Delphi: Two Case Studies

A.R. Flaten, A.A. Gill

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Passing Excellence, the Interactive Art Visualization of the Kizhi Ensemble

D. Tsoupikova

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The Metopes of Selinunte: Presentation of the Interactive CDROM

J.A. Beraldin, A. Bandiera, V. Valzano

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The Documentation of the Medieval Entrance of the Rhodes Fortification Complex

P. Gianniou, A. Georgopoulos, M. Tsakiri, K. Della

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TO TEACH DRAWING IN THE UNIVERSITY DEGREE IN “PRESERVATION AND RESTORATION OF CULTURAL HERITAGE” OF UNIVERSITY OF STUDIES OF TURIN, IN VENARIA REALE (ITALY).

R. Spallone^a

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KEY WORDS: Cultural Heritage, Geometry, Education, Learning, Representation

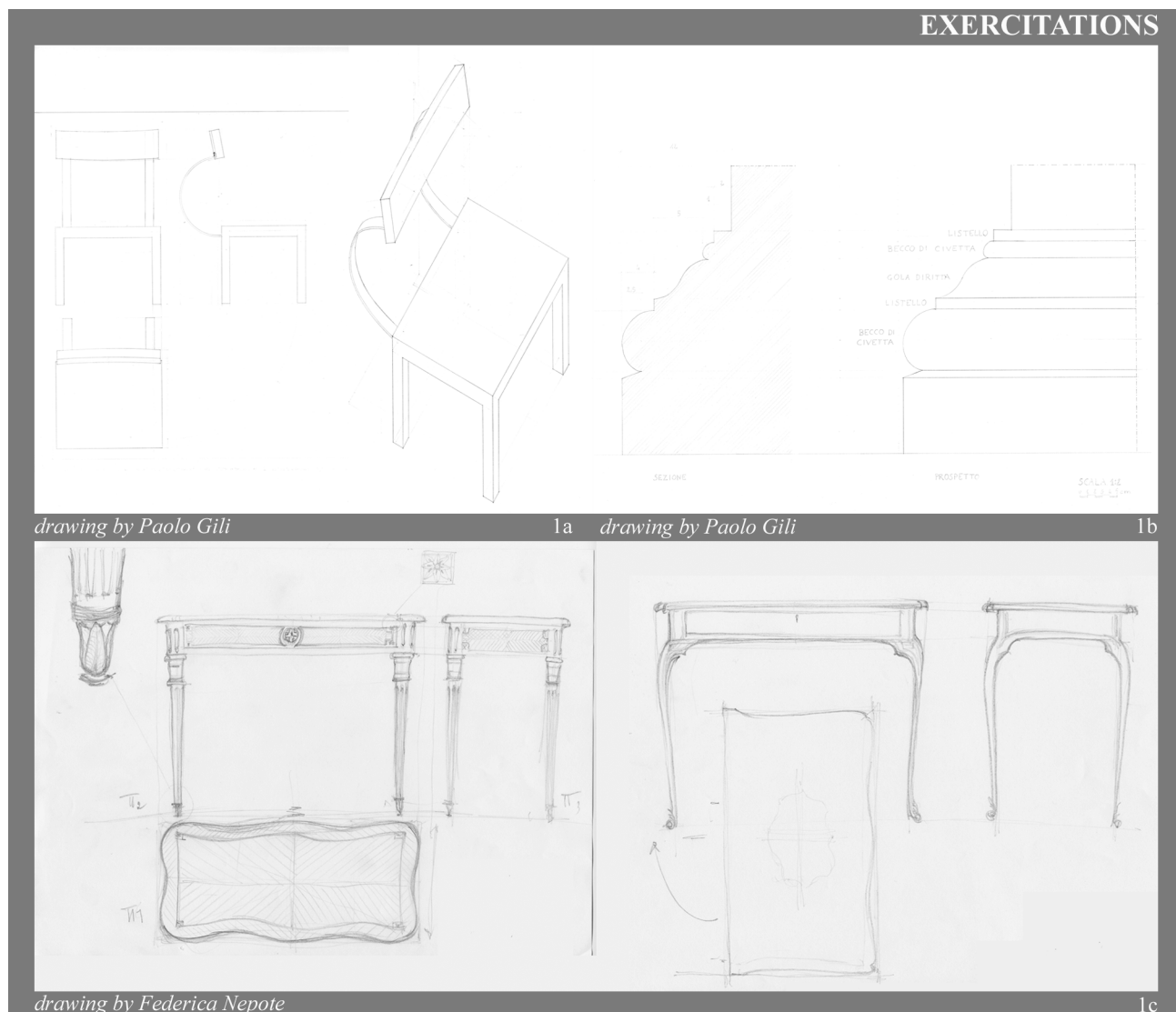
ABSTRACT

In this work I want to present my recent experience of teaching of Drawing and Introduction to descriptive geometry in “5 Magister”, the name of a new university degree instituted in the present academic year. This course, activated from University of Studies of Turin with the Centre of Preservation and Restoration “La Venaria Reale”, confers the degree in “Preservation and Restoration of Cultural Heritage” (Conservazione e Restauro dei Beni Culturali).

In this university degree, sole in Italy, the specialist studies are: stony material manufactures, painting on wood, painting on canvas, wooden painting sculpture, synthetic material manufactures, wooden material manufactures.

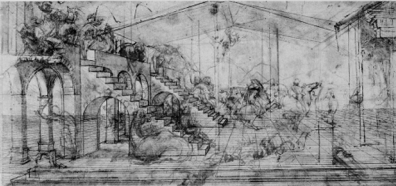
The teaching of Drawing and Introduction to descriptive geometry, fundamental in the Italian university degrees in Architecture, has been adapted to the specificities of the different specialist studies with the aim to constitute a common basis of knowledge for all the students.

In this writing I want to explain educational goals, didactic methodologies and results of the teaching.




LESSONS

La costituzione dei sistemi di rappresentazione fra teorie artistiche, arti figurative e formalizzazioni scientifiche
Roberta Spallone



Studio per l'Adorazione dei magi, 1481, Firenze



L'Adorazione dei magi, 1482, Firenze

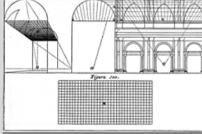
Arte contemporanea

- Farish
- Monge
- Canaletto
- Galli Bibiena
- Guarini
- Desargues
- Bernini
- Pozzo
- Vredeman
- Palladio, Veronese
- Vignola
- Leonardo
- Bramante
- Piero
- Piero
- Mantegna
- Filarete, di Giorgio
- Alberti
- Donatello, Masaccio
- Brunelleschi
- Giotto, Lorenzetti
- Villard
- Vitruvio


Teorie artistiche
Arti figurative

Teorie dei metodi di rappresentazione

La costituzione dei sistemi di rappresentazione fra teorie artistiche, arti figurative e formalizzazioni scientifiche
Roberta Spallone



Procedimento pratico per riportare le figure in prospettiva sulle superfici curve



Gloria di Sant'ignazio, 1691-1694, Sant'ignazio, Roma

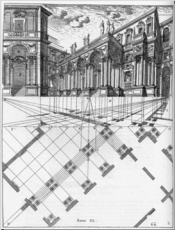
Arte contemporanea

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- Villard
- Vitruvio

Teorie artistiche
Arti figurative

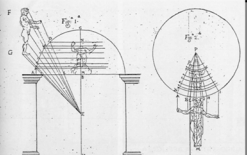
Teorie dei metodi di rappresentazione

La costituzione dei sistemi di rappresentazione fra teorie artistiche, arti figurative e formalizzazioni scientifiche
Roberta Spallone



Studio per scenografia

Modo di porre le figure in prospettiva nelle volte, cupole o altre superfici concave



Ferdinando Galli Bibiena, *Direzioni della prospettiva teorica*, Bologna 1732

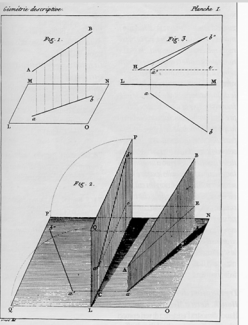
Arte contemporanea

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- Vredeman
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- Piero
- Piero
- Mantegna
- Filarete, di Giorgio
- Alberti
- Donatello, Masaccio
- Brunelleschi
- Giotto, Lorenzetti
- Villard
- Vitruvio

Teorie artistiche
Arti figurative

Teorie dei metodi di rappresentazione

La costituzione dei sistemi di rappresentazione fra teorie artistiche, arti figurative e formalizzazioni scientifiche
Roberta Spallone



Gaspard Monge, *Géométrie descriptive*, Paris 1799

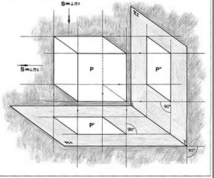
Arte contemporanea

- Farish
- Monge
- proiezioni ortogonali
- Guarini
- Desargues
- Piero
- prospettiva
- Alberti
- Brunelleschi

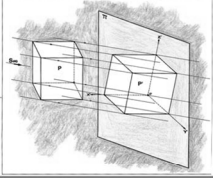
Teorie artistiche
Arti figurative

Teorie dei metodi di rappresentazione

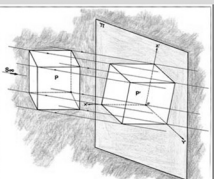
Proiezioni cilindriche e proiezioni coniche. Elementi fondamentali



proiezioni ortogonali



proiezione assonometrica



proiezione prospettica

UNIVERSITÀ DEGLI STUDI DI TORINO - CORSO DI LAUREA IN RESTAURO DEI BENI CULTURALI
Disegno e fondamenti di geometria descrittiva - aa. 2006/2007 - prof. Roberta Spallone

Solidi di rotazione. Sezioni e vera grandezza.

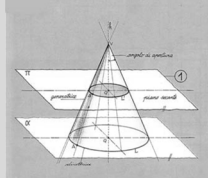
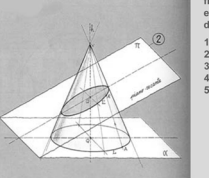
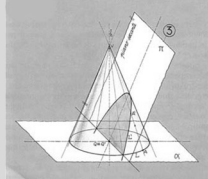
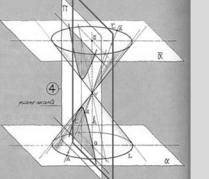





figure geometriche
esito dell'operazione
di sezione del cono:

1. cerchio
2. ellisse
3. parabola
4. iperbole
5. ... triangolo...

UNIVERSITÀ DEGLI STUDI DI TORINO - CORSO DI LAUREA IN RESTAURO DEI BENI CULTURALI
Disegno e fondamenti di geometria descrittiva - aa. 2006/2007 - prof. Roberta Spallone

1. A NEW TEACHING FOR AN ANCIENT DISCIPLINE.

It would appear to be universally recognised that fundamental role of drawing is to express and communicate as well as to extend knowledge. Hence particular importance is acquired by the fact that drawing develops from a perceptive process or from an idea, and that this idea – extending beyond the limits of what we could define as natural perception – requires a cultural and experiential support which means that every act of drawing

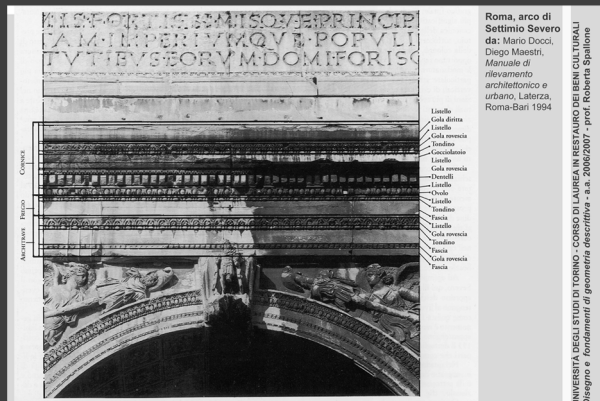
entails an external projection of one's own cultural knowledge. This meaning of drawing is central in the technical university degrees courses of "Representation".

In these universities the teaching of drawing is based on principles and methods of descriptive geometry, codified by Gaspard Monge at the end of eighteenth century.

The lessons of Monge in the Ecole normale de Paris (the future Ecole polytechnique, of which Monge was one of the founders), were gathered and published in the compendium treatise *Géométrie descriptive*, in 1798.

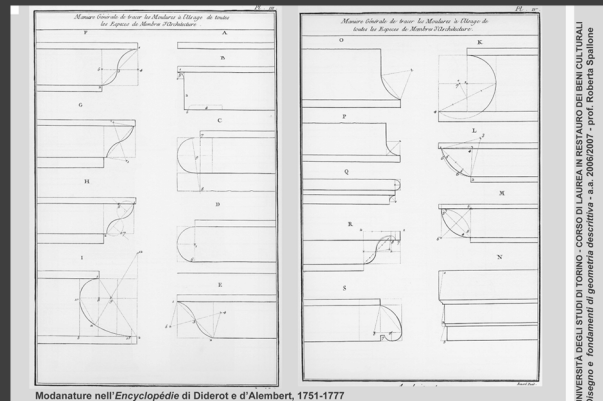
The methods of descriptive geometry create a bi-univocal

LESSONS



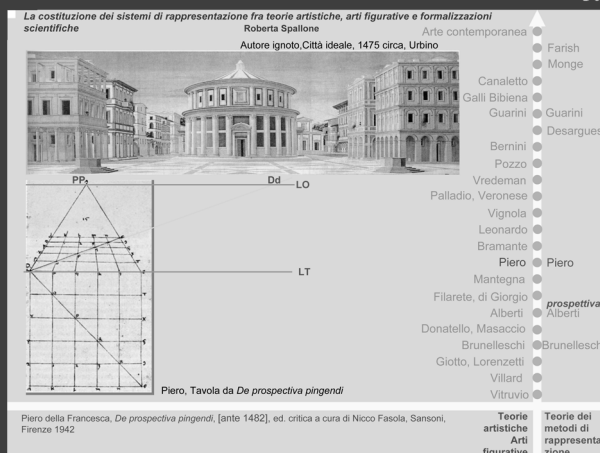
Disegno e convenzioni grafiche: spessori e tipi di linee, scale di riduzione, simboli e grafie per la rappresentazione dei materiali, quotature. Le modanature.

3a

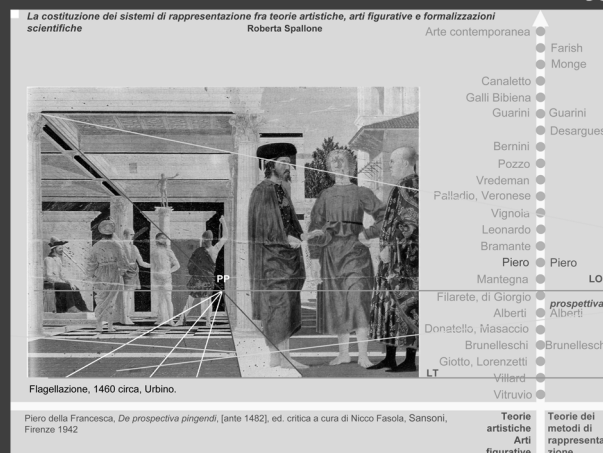


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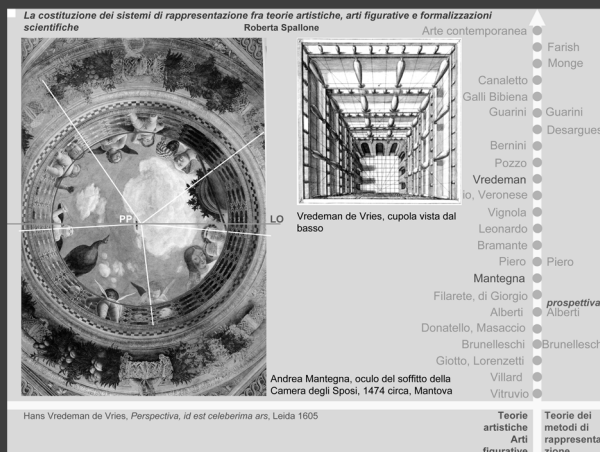
3b



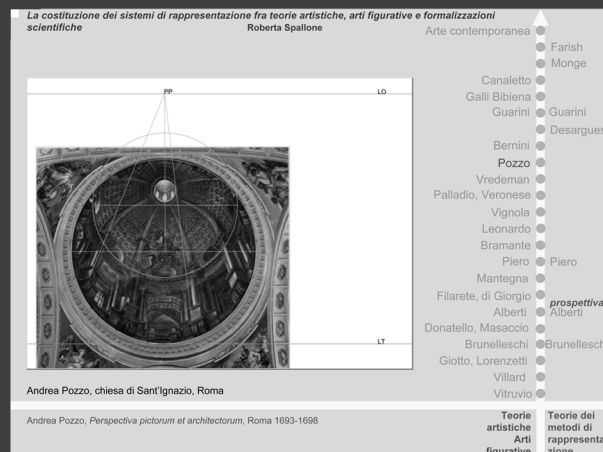
3c



3d



3e



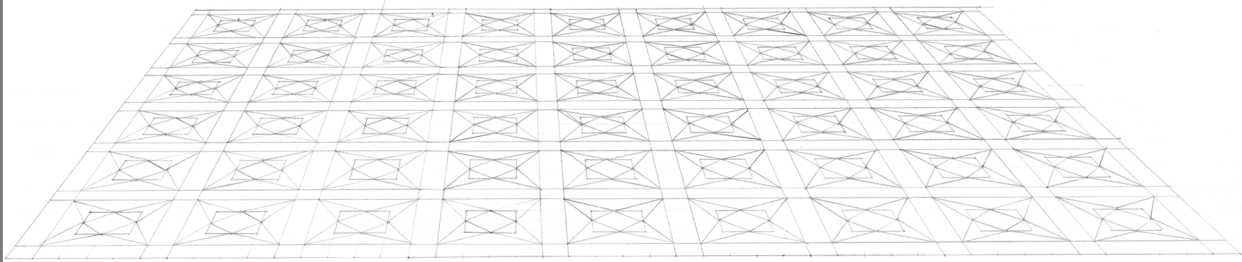
3f

relationship between the model depicting the entity and the entity represented by the model, so that from the model it is possible to go back to the knowledge of any formal property of the entity, in the same way that the formal knowledge of the entity made it possible to arrive at the constitution of the model. Actually, this teaching is one of the basilar discipline in the Italian university degrees in Architecture, Building Engineering and Civil Engineering. Since 2000 I was professor of Fundamentals of descriptive geometry and of Architectural drawing in the I Faculty of Architecture of the Polytechnic of Turin.

The new university inter-faculty degree, named "5 Magister", in "Preservation and Restoration of Cultural Heritage" (Conservazione e Restauro dei Beni Culturali), has been instituted in the present academic year from University of Studies of Turin with the Centre of Preservation and Restoration "La Venaria Reale". I was charged by teaching of Drawing and Introduction to descriptive geometry.

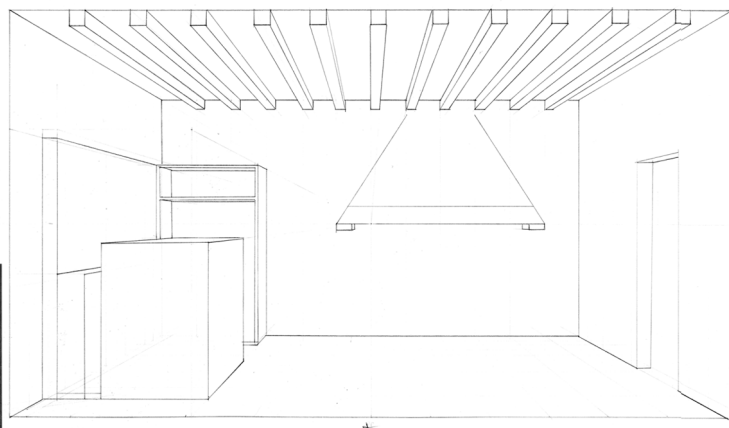
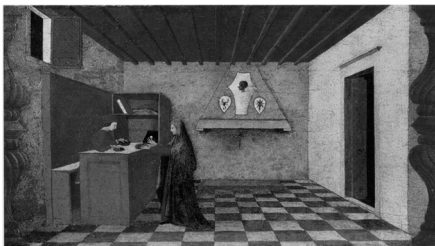
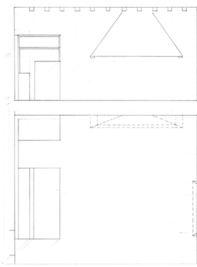
In this university degree, sole in Italy, the specialist studies are: stony material manufactures, painting on wood, painting on canvas, wooden painting sculpture, synthetic material manufactures, wooden material manufactures.

EXERCITATIONS



drawing by Paolo Gili

4a



drawing by Paolo Gili

4b

2. EDUCATIONAL GOALS AND DIDACTIC METHODOLOGIES OF TEACHING.

For the reason given above, the educational program had not reference in other national experiences.

The teaching of Drawing and Introduction to descriptive geometry, has been adapted to the specificities of the different specialist studies with the aim to constitute a common basis of knowledge for all the students.

In fact the principles of descriptive geometry, consisting of parallel projections and central projections, have been applied to the analysis, interpretation, reconstruction and representation of the different artistic manufactures.

These applications have been also supported by lessons of drawing and graphic standards.

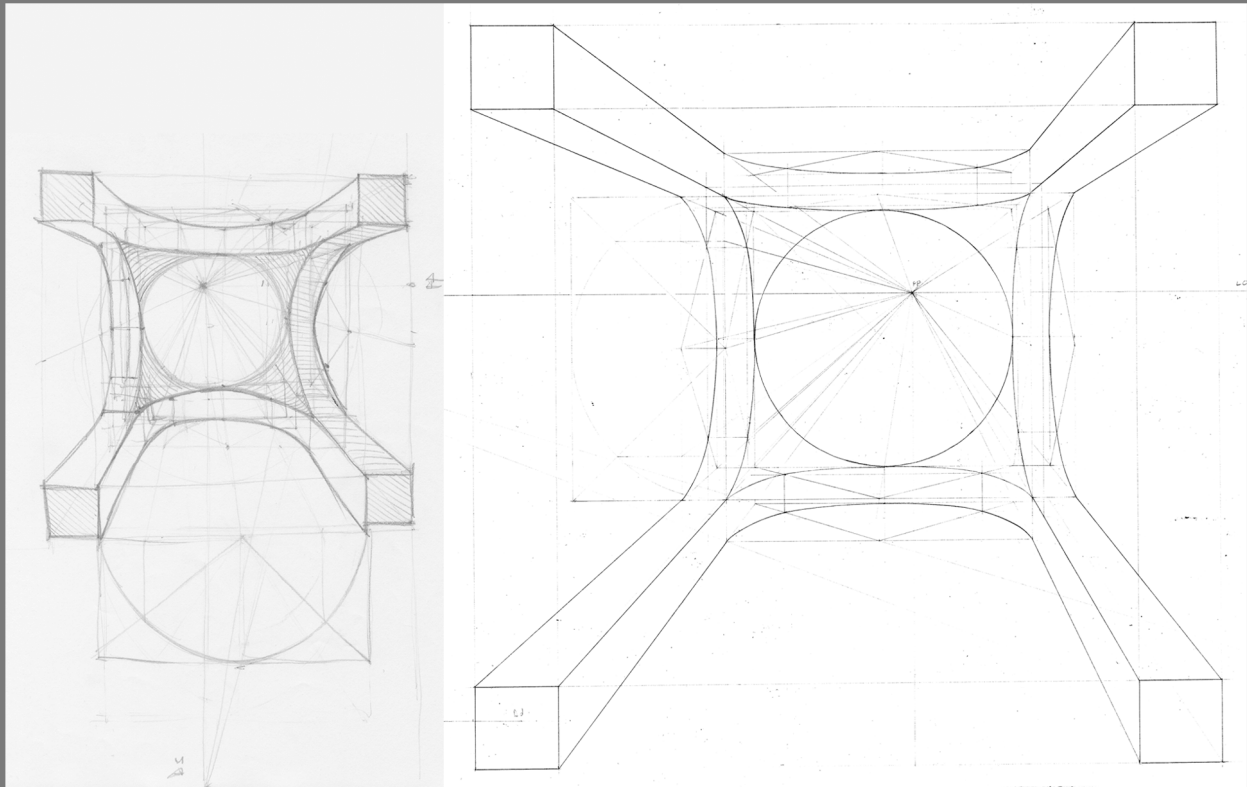
One of the most important topics of the teaching is the history of representation that focuses the relationship between artistic treatises, visual arts and scientific studies (figures 2a, 2b, 2c, 2d, 3b).

This topic, reminded in all the lessons, is fundamental to recognize the period, the method and the technique of realization of the artistic manufactures.

This knowledge enables the students to surveying, for example, stony and wooden moulding (figure 1b) and antique furniture (figure 1c).

Moreover enables the students to restore the perspective pattern of paintings (figures 4a, 4b).

EXERCITATIONS



sketch by Alessandra Nepote, drawing by Anna Balbo

5a



drawing by Paolo Gili

5b

The orthogonal and the axonometric projections have been developed on the fundamental geometric entities and shapes. In particular these topics have been deepened: the intersections

of polyhedrons and of surfaces of revolution with planes and the mutual intersections of polyhedrons. The knowledge of the principles and of the rules of these

projections allows to analyze and to represent three-dimensional manufactures by plans, fronts, sections, and by isometric views (figure 1a).

The perspective projections have been explained with continuous references to the history of representation and of visual arts, in particular to the scientific theories of Filippo Brunelleschi, Leon Battista Alberti and Piero della Francesca and to the compendious practice treatises of Jacopo Barozzi da Vignola, Hans Vredeman de Vries, Andrea Pozzo and Ferdinando Galli Bibiena.

These references permit to face correctly the problem of the perspective restitution of paintings, fundamental topic in the curricula of restoration of painting.

In particular the books of Andrea Pozzo and Ferdinando Galli Bibiena, compared with their drawings and paintings, have been referred to the problem of perspective on horizontal picture of projection (figure 5a).

This topic has been applied to the analysis of paintings and frescos on the vaults (figures 3e, 3f).

3. RESULTS OF THE TEACHING AND POSSIBLE INTERDISCIPLINARY DEVELOPMENTS .

After every lesson I proposed exercises in application of the theory, as is documented in figures 1, 4 and 5.

Orthogonal and axonometric projections have been applied to represent furniture, i.e. the chair "Follia" of Giuseppe Terragni (1934), starting from illustrations in a catalogue (figure 1a).

Surveying methods for moulders and details and graphic standards have been used both for the survey and the technical drawing of a antique stone moulder (figure 1b) and for the sketches of some antique furniture belonging from the Museum of Stupinigi (figure 1c).

Perspective projections have been developed about the problem of perspective restitution. The reconstruction of "perspective box" (figures 3c, 3d) has been simulated on the flooring of a Renaissance fresco of Filippo Lippi, - Il festino di Erode, Prato, 1452-1464 - (figure 4a) and on the perspective pattern of a tempera painting on wood of Paolo Uccello - Il miracolo dell'ostia profanata, Urbino, 1467-1468 (figure 4b).

The teaching of drawing, also in the form of 2D and 3D digital drawing and modelling, could be developed in a interdisciplinary didactic activity of compilation of catalogues of Cultural Heritage, supported by GIS systems.

These catalogues, including drawings with measure and details of the manufactures, 3D digital models, historical, archival and bibliographic references, scientific photographs, could become the bases for the chemical and physical analysis and for the projects of restoring.

Moreover, the information systems, implemented with the results of the analysis, could be useful to communicate with the other centres of restoring of cultural heritage.

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